

IN THE CLAIMS:

Please cancel claims 1-36 and add new claims 37-60, as set forth below.

Claims 1-36 (Canceled)

1 37. (New) A thermal management system for an integrated circuit die
2 comprising:
3 a temperature sensor formed directly on the die, the temperature sensor having an output;
4 a power modulation element formed directly on the die, the power modulation element to
5 reduce power consumption of the die in response to the output of the temperature
6 sensor;
7 a control element formed directly on the die, the control element including at least one
8 register to provide an enable/disable bit for the thermal management system; and
9 a visibility element formed directly on the die, the visibility element to indicate a status of
10 the output of the temperature sensor.

1 38. (New) The thermal management system of claim 37, wherein the
2 temperature sensor comprises:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 39. (New) The thermal management system of claim 38, further comprising a
2 pulse dampener coupled to the first signal line, the pulse dampener to at least partially
3 remove electrical noise from the reference voltage.

1 40. (New) The thermal management system of claim 38, further comprising
2 an analog filter coupled to the second signal line and the first signal line, the analog filter
3 to detect voltage spikes present in the reference voltage and to add substantially identical
4 voltage spikes to the programmable voltage.

1 41. (New) The thermal management system of claim 38, further comprising a
2 digital filter coupled to an output of the comparator, the digital filter including an up-
3 down counter to count clock pulses, the up-down counter to increment once for each
4 clock pulse detected when the comparator output is at a first state and to decrement once
5 for each clock pulse detected when the comparator output is at a second state.

1 42. (New) The thermal management system of claim 37, the control element
2 further including at least one of a register to selectively disengage a specified portion of
3 the thermal management system, a register to enable the thermal management system in
4 response to an occurrence of an external event, a register to force the thermal
5 management system active while overriding a disable bit provided by the at least one
6 register, and a register to allow external software and hardware to enable the thermal
7 management system.

1 43. (New) The thermal management system of claim 37, the visibility
2 element including at least one of a register to indicate the status of the temperature sensor
3 output, a register to provide a sticky bit, a counter to count a number of lost clock cycles
4 resulting from operation of the thermal management system, and circuitry to generate an
5 interrupt when the temperature sensor output transitions to a different state.

1 44. (New) The thermal management system of claim 37, the power
2 modulation element to reduce the power consumption of the die by performing at least
3 one of lowering a supply voltage to the die, lowering a frequency of a clock signal
4 provided by internal clock circuitry on the die, performing clock gating of the clock
5 signal, performing clock throttling of the clock signal, selectively blocking clock pulses
6 of the clock signal, disabling at least one of a plurality of functional units on the die,
7 limiting instructions sent to at least one of the plurality of functional units, and changing
8 a behavior of at least one of the plurality of functional units.

1 45. (New) An apparatus comprising:
2 a die; and
3 a thermal management system formed directly on the die, the thermal management
4 system including
5 a temperature sensor, the temperature sensor having an output;
6 a power modulation element to reduce power consumption of the die in
7 response to the output of the temperature sensor;
8 a control element including at least one register to provide an
9 enable/disable bit for the thermal management system; and
10 a visibility element to indicate a status of the output of the temperature
11 sensor.

1 46. (New) The apparatus of claim 45, wherein the temperature sensor
2 comprises:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 47. (New) The apparatus of claim 46, further comprising a pulse dampener
2 coupled to the first signal line, the pulse dampener to at least partially remove electrical
3 noise from the reference voltage.

1 48. (New) The apparatus of claim 46, further comprising an analog filter
2 coupled to the second signal line and the first signal line, the analog filter to detect
3 voltage spikes present in the reference voltage and to add substantially identical voltage
4 spikes to the programmable voltage.

1 49. (New) The apparatus of claim 46, further comprising a digital filter
2 coupled to an output of the comparator, the digital filter including an up-down counter to
3 count clock pulses, the up-down counter to increment once for each clock pulse detected
4 when the comparator output is at a first state and to decrement once for each clock pulse
5 detected when the comparator output is at a second state.

1 50. (New) The apparatus of claim 45, the control element further including at
2 least one of a register to selectively disengage a specified portion of the thermal
3 management system, a register to enable the thermal management system in response to
4 an occurrence of an external event, a register to force the thermal management system
5 active while overriding a disable bit provided by the at least one register, and a register to
6 allow external software and hardware to enable the thermal management system.

1 51. (New) The apparatus of claim 45, the visibility element including at least
2 one of a register to indicate the status of the temperature sensor output, a register to
3 provide a sticky bit, a counter to count a number of lost clock cycles resulting from
4 operation of the thermal management system, and circuitry to generate an interrupt when
5 the temperature sensor output transitions to a different state.

1 52. (New) The apparatus of claim 45, the power modulation element to
2 reduce the power consumption of the die by performing at least one of lowering a supply
3 voltage to the die, lowering a frequency of a clock signal provided by internal clock
4 circuitry on the die, performing clock gating of the clock signal, performing clock
5 throttling of the clock signal, selectively blocking clock pulses of the clock signal,
6 disabling at least one of a plurality of functional units on the die, limiting instructions
7 sent to at least one of the plurality of functional units, and changing a behavior of at least
8 one of the plurality of functional units.

1 53. (New) A system comprising:
2 a memory coupled with a bus; and
3 a processor coupled with the bus, the processor including a die and a thermal
4 management system formed directly on the die, the thermal management system
5 including
6 a temperature sensor, the temperature sensor having an output;
7 a power modulation element, the power modulation element to reduce
8 power consumption of the processor in response to the output of
9 the temperature sensor;
10 a control element, the control element including at least one register to
11 provide an enable/disable bit; and
12 a visibility element, the visibility element to indicate a status of the output
13 of the temperature sensor.

1 54. (New) The system of claim 53, the at least one temperature sensor
2 comprising:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 55. (New) The system of claim 54, further comprising a pulse dampener
2 coupled to the first signal line, the pulse dampener to at least partially remove electrical
3 noise from the reference voltage.

1 56. (New) The system of claim 54, further comprising an analog filter
2 coupled to the second signal line and the first signal line, the analog filter to detect
3 voltage spikes present in the reference voltage and to add substantially identical voltage
4 spikes to the programmable voltage.

1 57. (New) The system of claim 54, further comprising a digital filter coupled
2 to an output of the comparator, the digital filter including an up-down counter to count
3 clock pulses, the up-down counter to increment once for each clock pulse detected when
4 the comparator output is at a first state and to decrement once for each clock pulse
5 detected when the comparator output is at a second state.

1 58. (New) The system of claim 53, the control element further including at
2 least one of a register to selectively disengage a specified portion of the thermal
3 management system, a register to enable the thermal management system in response to
4 an occurrence of an external event, a register to force the thermal management system
5 active while overriding a disable bit provided by the at least one register, and a register to
6 allow external software and hardware to enable the thermal management system.

1 59. (New) The system of claim 53, the visibility element including at least
2 one of a register to indicate the status of the temperature sensor output, a register to
3 provide a sticky bit, a counter to count a number of lost clock cycles resulting from
4 operation of the thermal management system, and circuitry to generate an interrupt when
5 the temperature sensor output transitions to a different state.

1 60. (New) The system of claim 53, the power modulation element to reduce
2 the power consumption of the processor by performing at least one of lowering a supply
3 voltage to the die, lowering a frequency of a clock signal provided by internal clock
4 circuitry on the die, performing clock gating of the clock signal, performing clock
5 throttling of the clock signal, selectively blocking clock pulses of the clock signal,
6 disabling at least one of a plurality of functional units on the die, limiting instructions
7 sent to at least one of the plurality of functional units, and changing a behavior of at least
8 one of the plurality of functional units.